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This study was an attempt to compare the effectiveness of videotaped segments with that of conventional teaching methods. Students enrolled in business, chemistry, electronics, engineering, and nursing courses at Shoreline Community College (Washington) participated in the study. The Mann-Whitney test for unequal N and T tests was used to determine statistical differences in test performance between experimental and control groups. Students in business, chemistry, and nursing exposed to the videotaped instruction performed significantly better than those receiving conventional instruction. In electronics and engineering, however, only slight differences were found between the two groups. It was concluded that wider use of videotaped instruction for the teaching of special skills would be beneficial and that further exploration, especially in technical-vocational areas and the more cognitive subject areas, is desirable. (MB)

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VIDEOTAPED INSTRUCTION FOR THE TEACHING OF SKILLS

By

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JC 690 315

Shoreline Community College

July 17, 1969

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In the Spring of 1968, the State Washington Community College Board awarded a grant to Shoreline Community College. This grant was to be used to study the effectiveness of videotaped instruction. As the coordinator of this project, I would like to thank the State Board for Community College Education and Dr. Albert A. Canfield, Director of the Washington State Community College system, for the funding of this project.

The most important aspect of this grant was the actual videotaping in each subject area. The principle instructors involved with the videotaping were:

Business	-	Mrs. Sally Rollman
Chemistry	-	Mr. David Rosenquist
Electronics	-	Mr. John Reddie
Engineering	-	Mr. Richard Prouty
Nursing	-	Mrs. Geraldine Calder

In addition, the following instructors helped with the productions, Mr. Burton Weston, Mrs. Geraldine Smith and Mrs. Ann Madison.

Mr. Gerald Magelssen, Mr. James Holz and all of the media center personnel at Shoreline Community College provided equipment when needed, artistic skills, and other professional services.

Mr. James Morishima, Mr. Ron Bell and Mr. Howard Hubbard provided statistical advice and computer programming.

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ABSTRACT

This study was an attempt to evaluate the effectiveness of videotaped segments to implement classroom instruction. A statistical comparison of this technique and the conventional teaching methods was made.

Low cost, portable video equipment was used. The equipment was employed under actual classroom conditions. The instructors involved in the study helped in preparation of the tapes and in the operation of the equipment.

Specific skills in five subject areas, business, chemistry, electronics, engineering, and nursing, were studied. In business, chemistry, and nursing, the students using the videotaped instructions preformed statistically better on tests than those receiving the conventional instruction. In electronics and engineering, there was little difference on tests between those students using videotaped instruction and those taught by conventional instruction.

These results would seem to indicate that videotaped instruction is desirable in those areas studied at Shoreline Community College. An attempt should be made to study the effectiveness of this type of media in other areas--Vocational, Technical, and Academic.

The instructors involved were enthusiastic about using the videotape technique. This enthusiasm may have accounted for some of the success noted by students using the videotapes.

Students involved in the study were asked to complete a critique of the videotapes. A cursory examination of these critiques indicate a wide range of attitudes toward the videotapes. Comments ranged from "fine--they gave us a

very good visual impression" to "A waste of time and effort." Generally, however, students seemed to like the videotaped instruction. Again the results which were observed may have been due to the Hawthorne effect.

It is felt that a student will learn the best when exposed to the most opportune stimuli. Videotapes have the advantage of exposing students to visual, audio, and lexicon modes of stimuli. This form of media, when made available along with as many other forms as possible is bound to enhance learning.

VIDEOTAPED INSTRUCTION FOR THE TEACHING OF SKILLS

Purpose

The major goal of this study was to assess the value of videotaped instruction for the teaching of special skills as compared with conventional methods of teaching these skills. Five different subject areas at Shoreline Community College were studied in relation to this goal.

The availability of inexpensive videotape recorders and cameras have made this media attractive to educational institutions. As pointed out by Holmes (1962) and Alkire (1969) informational transmission by humans of the script, visual and audio modes can be implemented through the use of video equipment.

Several possible benefits could accrue through the use of video equipment.

1. If videotaped instructions could be utilized for the teaching of less complex skills, more of the instructor's time could be made available for the teaching of more complex skills which require constant feedback.
2. The efficient use of time which might be made possible by using videotaped instruction would free the instructor for more hours of preparation and student conferences. (Frantz, 1965)
3. The use of videotaped instruction might improve the quality of teaching, since constant updating and revision will be necessary. (Frantz, 1965)

4. Videotaped instruction would allow more flexible scheduling of student programs. (Woolsey, 1966)
5. Since the same videotaped program could be used repeatedly, uniformly consistant instruction of skills would be possible. (Neidt, 1967)
6. Students would be able to make "continuous progress" by using the videotaped segments at their own rate of learning.

Procedure

Five diversified subject areas were used in this study. These were business, chemistry, electronics, engineering, and nursing. A specific skill which has been required of students in each area was chosen by the instructors. The title of each videotape segment indicates the nature of these skills. They are as follows:

SUBJECT AREA	TITLE	COURSE
Business	Use of a Printing Calculator	Secretarial Science 172
Chemistry	Use and Care of Laboratory Balances	Chemistry 100
Electronics	Phase Shift Measurement in an AC Circuit	Electronics 151
Engineering	Point Line Plane Method of Analyzation to Draw a Third View	Engineering 101
Nursing	Changing a Surgical Dressing	Nursing 101

An instructor in each area prepared a twenty to thirty minute presentation to instruct students in the specific skill. After several rehearsals a videotape recording was made of the presentation.[1] The students who were to use the videotaped presentation were in the class of the instructor who made the videotape. The control group of students was in another class taught by a different instructor in the cases of chemistry, electronics and nursing. Different instructors were used in three subject areas to attempt to eliminate the Hawthorn effect and to prevent exact duplication of the videotaped presentation. These instructors were familiar with teaching the specific skill but did not view the videotaped presentation and were not familiar with the nature of the experiment. In business and engineering, the same instructor who prepared the videotape taught the specific skill to the control group in the conventional manner. That is, in the manner which had been used to teach the skill during previous offerings of the course.

At the time during the course when the specific skill involved was scheduled to be taught, the experimental group of students was told that the videotape was available for their use and that they could view the tape as many times as necessary to become familiar with the skill. The instructors of the experimental students did not answer questions concerning the videotaped presentation.

The nature of the skills involved in all areas required a physical response on the part of the students. Students were given the opportunity to make this physical response in a laboratory or clinical situation. At the end of the time allotted the teaching of the specific skill in each subject area, a test of the specific skill was administered to both the experimental and control groups.

These tests were constructed jointly by the instructor who prepared the videotape and the instructor who taught the students in the conventional manner.

Hypothesis to be Tested

It was assumed that there was no difference in the effectiveness of teaching the specific skills in these five subject areas using videotaped instruction as compared with conventional teaching methods. It was determined that the null hypothesis would be rejected at the .05 level of confidence.

The original experimental design called for a matched pair comparison of test scores of the experimental and control groups. This pairing was to be done using the student's high school grade point average. In order to test the reliability of using this method of comparison, each student's test score in the five subject areas and his high school grade point average was programmed into a computer. It was shown that there was no correlation between the test score and the high school grade point average of any of the students involved. For this reason, the paired comparison method was not employed.

It was assumed that students were randomly assigned to the particular courses during the registration process. The experimental and control groups in each course were chosen based on the availability of the instructors to participate in the experiment. However, since the N in each group (see Table I) was not large, a nonparametric statistic was employed. Even though there was some knowledge of the distribution of the population, it was felt that it was best to employ a statistical method which makes no assumption regarding the distribution and the parameters of the population (Alder and Roessler, 1964). The test used in this case was the Mann-Whitney Test for unequal N (Siegel, 1956). However, the T Test was also employed to compare with the results of the Mann-Whitney.

In addition to performing the Mann-Whitney and T Tests in the experimental and control group in each area, the scores of the experimental students and the scores of the control students were pooled and the difference between the mean of these scores was tested using the Z Test. (Freund, 1967)

Table I

N in Experimental and Control Groups

	N1	N2
Business	21	19
Chemistry	21	36
Electronics	13	20
Engineering	10	12
Nursing	46	44
Total	111	131

N1 = Control Group
N2 = Experimental Group

Results

Table II and Figure 1 indicate the differences between the mean of the test scores of the experimental and control groups in each of the five subject areas. As can be seen, there is a considerable difference between the mean test scores of the experimental and control group in the areas of business, nursing, and chemistry, while slight or no differences occur in electronics and engineering.

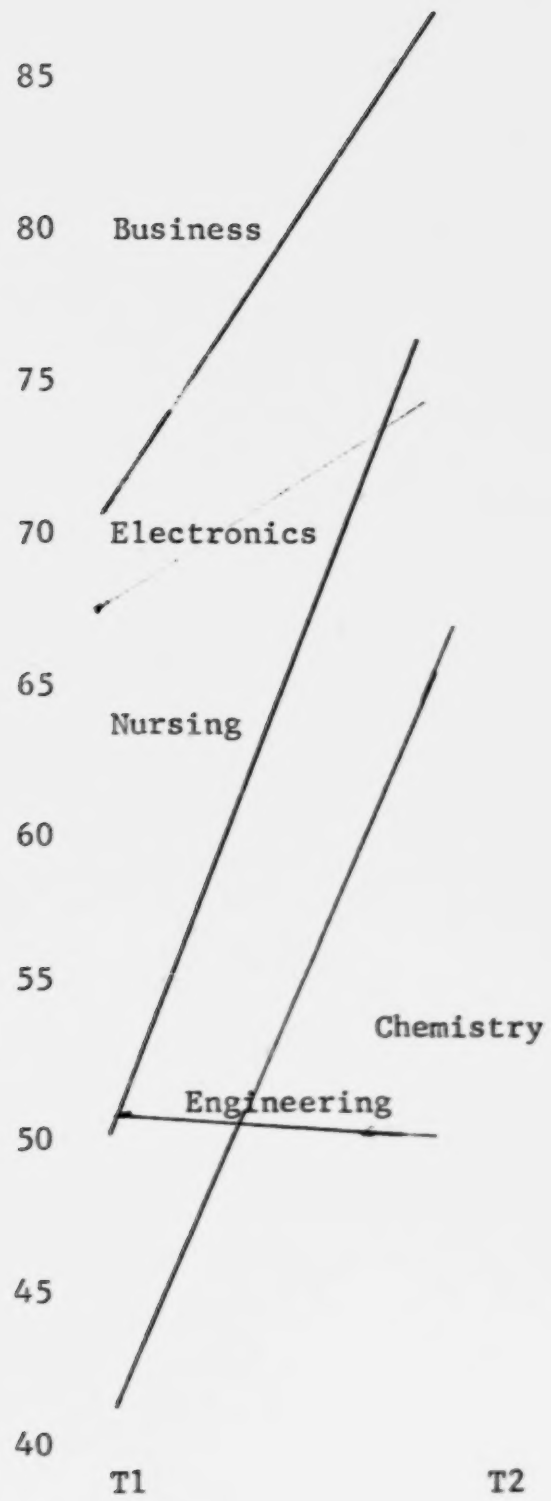
Table II

Mean Scores and Differences Between Mean Scores of Both Treatment Groups

	T1	T2	D(T2-T1)
Business	70.1	86.7	16.6
Chemistry	42.8	66.0	23.2
Electronics	67.7	72.5	4.8
Engineering	52.0	50.8	-1.2
Nursing	50.8	74.0	23.2

T1 = Control Group
T2 = Experimental Group

Figure 1
Line Plot of Means of Both
Treatment Groups



T1 = Control Group
T2 = Experimental Group

The results of the Mann-Whitney and T Tests are indicated in Tables III and IV. The differences between means of the business, chemistry, and nursing are highly significant, while the differences between means of electronics and engineering are not significant.

Table III

Mann-Whitney Z Scores in the Five Subject Areas

	Z
Business	9.87*
Chemistry	2.09**
Electronics	.65
Engineering	.32
Nursing	4.04*

* .001 Level of Confidence
** .02 Level of Confidence

Table IV

T Scores, Standard Deviation, and Degrees of Freedom

	T	SD	DF
Business	3.24*	5.09	38
Chemistry	2.65**	7.83	55
Electronics	.54	8.87	30
Engineering	.09	13.08	20
Nursing	5.17*	4.10	88

* Significant at the 0.001 Level of Confidence
** Significant at the 0.01 Level of Confidence

The pooled data results are indicated in Table V. These results also show a highly significant difference between experimental and control groups regardless of subject matter.

Table V

Pooled Data Z Score, Standard Deviation for T1 and T2 and Degrees of Freedom

	T1	T2	
Z	SD	Sd	DF

Pooled Da

* Signifi

The null hypothesis was rejected in the cases of business, chemistry, and nursing and was accepted in the cases of electronics and engineering.

Another collateral aspect of this study was to look at sex differences in the experimental and control groups. Nursing students who were primarily female performed (Figure 1) better using videotapes than engineering students who were primarily male. The question arose: Was this difference due to sex? By pooling the data and looking at the differences in Table VI and Figure 2 between the means of the experimental and control groups, it appeared that sex made little difference as to whether or not the videotaped instructions were effective.

Table VI

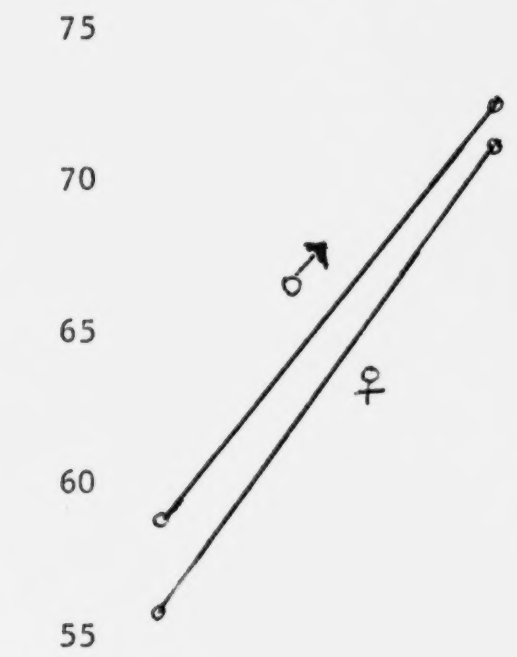
N and Means for Both Treatment Groups

	T1		T2		
	Male	Female	Male	Female	Total N
N	41	70	61	70	242
Mean	58.23	55.19	71.03	70.03	

T1 = Control Group
T2 = Experimental Group

Figure 2

Line Plot of Means of Both Treatment Groups



♂ = Male ♀ = Female

T1 = Control Group
T2 = Experimental Group

Discussion and Conclusions

In three subject areas (business, chemistry and nursing) students using videotaped instructions performed significantly better on tests for specific skills than students taught in the conventional manner. Students in electronics and engineering, using videotaped instruction, performed as well or nearly as well on these tests as students taught these skills in the conventional manner.

These results would indicate that wider use of videotaped instructions for the teaching of special skills would be desirable at Shoreline Community College.

The benefits of using this media as outlined at the beginning of this paper are also strong inducements for the use of videotape in the classroom.

There was no correlation between the students' test scores in five subject areas and their high school grade point average. One explanation of this result could be that the skills involved in this experiment were largely manipulative, whereas the high school grade point average is generally an indication of cognitive skills.

There was considerable difference between students in business, chemistry, and nursing and those in electronics and engineering. It was assumed that the technical content of the videotapes in electronics and engineering was no more difficult to these students than the content of the videotapes in the other areas. However, this assumption may not have been valid. A content analysis of each videotape in relation to the students' ability should probably be performed.

Video, audio, and written modes of stimuli impinge on a student's senses during the teaching process. Videotapes have the advantage of combining these modes in one form of media. However, it is thought that students vary in their ability to accept any or all of the modes of stimuli. Making all forms of stimuli used in the teaching process available for each student and allowing the student to select the form best suited for his particular need would seem to enhance a student's ability to learn.

This study was aimed at the teaching of certain specific skills. Current developments in Vocation-Technical Training make the teaching of manipulative skills even more wide spread. Certainly the use of videotape should be explored in the many skills involved in other areas.

In addition, the use of videotape in a controlled experiment in more cognitive subject areas such as philosophy, history, foreign languages, etc., should be explored.

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